

**EFFECTIVENESS OF CITES AT MITIGATING ILLEGAL TRAFFICKING OF  
EUROPEAN EELS**

by

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## **Abstract**

In 2007, as a result of drastic population decline over the last century, European eels were added to Appendix II of CITES in order to regulate and limit its trade exploitation. However, illegal trade of these species is still rampant to meet consumption demand in Asia and Europe. This suggests that CITES is not armed with the tools necessary for effective implementation and not sufficiently using these tools; therefore, amendments to this treaty are necessary. A review of government reports and literature indicate existing gaps in European eels morphological and life cycle research along with technological limitations that contribute to poor implementation of CITES regulation for European eels resulting in significant presence of illegal trafficking. To address these limitations, CITES amendments are recommended to allow for more effective mitigation of European eel trafficking. However, an effective approach to trade regulation requires a dynamic policy approach. Relying on one instrument, such as CITES, to possess all the tools to deter illegal wildlife trafficking is unreasonable. Rather, multiple policies that employ different sets of tools should be implemented in a complementary way to promote sustainable trade practices.

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## **1. Executive Summary**

This report highlights the policy limitations within CITES, a major international trade treaty, by analyzing its poor regulation of European eels. As a result of limited scientific knowledge on the species and inaccessible technological development, tools available to regulate its trade are not effectively implemented. The focus of this report is the trafficking of European eels within and between Asian and European countries, specifically in ways to meet consumption where demand is high. By reviewing available literature and studies, potential amendments to CITES are suggested to allow it to regulate European eel trade and mitigate illegal trafficking more effectively, given existing limitations and challenges. This analysis also advocates for a dynamic approach to trade regulation through the adoption of complementing policies and approaches. One should disperse the valuable tools among various regulatory instruments and institutions. A way to integrate this dynamic approach towards European eel trade regulations is then explored.

This report is valuable since rapid decline experienced in many species' populations, including the European eels, makes them susceptible to extinction. Many researchers believe we are currently experiencing the early stages of the 6<sup>th</sup> mass extinction, brought on by large scale anthropogenic activities (Barnosky, 2011). As we lose our biodiversity, the impact on the environment and human livelihood is detrimental, thus conservation efforts are critical (Cardinale., 2012). Therefore, as we implement policies to support conservation efforts, it is important that we are analyzing its effectiveness in contributing to this larger goal. This includes evaluating potential challenges and limitations, applying the necessary tools, and advancing necessary scientific research and technological aids.

## **2. Research Question:**

What limitations exist within CITES contributing to the poor trade regulations and rampant illegal trafficking of European eels? How can CITES be amended and what policies can be implemented to respond to these limitations and challenges?

## **3. Introduction**

Humans and their desire for development have played a central role in the large-scale species loss witnessed since industrialization swept the globe. For many species, anthropogenic activities have been the main driver in their population loss. In the 19th century, decline in eel populations began to raise alarms (Aalto, 2015). All continental Europe where *Anguilla anguilla*, also known as European eel, populations are naturally abundant, experienced drastic decline. The result of the decrease is due to multiple adjoining factors including overfishing, barrier to migration, pollutants, changing ocean currents, and turbines (Wickström, 2008). In an effort to recover their population, protecting these species, their environment, and minimizing acts that have significant negative impacts on their population is crucial. For the European eel, their exploitation for trading purposes largely contributes to their continued endangerment (Crook, 2010).

In 2007, The European eel was listed under Appendix II of The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which went into force in 2009 (Richards, 2020). The main purpose of CITES is to ensure that international trade does not occur at the expense of wild flora and fauna conservation (CITES Treaty, 1973). It ultimately does this through two main approaches, threat management and threat prevention. The



way CITES manages threat to species is by heavily regulating international trade of species threatened with extinction and are or may be affected by trade. Regulation extends from the species itself (e.g., live animals and plants) to its products (e.g, food, leather, trinkets). CITES also has a preventative measure by including regulations to international trade of species that are not considered threatened with extinction but are vulnerable to it from a trade perspective. Although, European eel CITES listing did not affect trade within The European Union (EU), it drastically affects trades with non-EU countries, which under CITES will require a non-detriment finding (NDF). Since 2010, A NDF was never determined, hence, banning all commercial trade of this eel species (Friedman, 2021). Still, The European eel remains one of the largest commercially exploited marine species listed under CITES (Friedman, 2021).

Despite the efforts by CITES to ensure sustainable trade of European eels, it has been unsuccessful at mitigating illegal trafficking of these eels. The technological aids and research available for European eels highlights the limitations present in CITES to be an effective instrument when this species is considered. The purpose of this review is to demonstrate the importance of amending policies like CITES to further improve its trade regulations of species like the European eel by analyzing where limitations exist and what modifications can be implemented. However, expecting one treaty to be fully effective at combating illegal wildlife trafficking is unrealistic. Therefore, it is also essential that complementing policies are implemented to mitigate illegal trafficking and ensure sustainable trade of species with vulnerable populations.

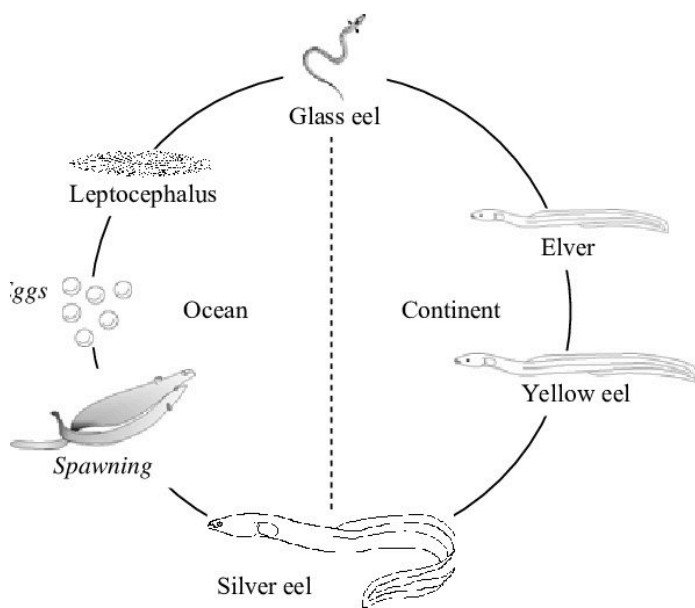
## **4. Background**

### ***4.1 The Decline of European Eel Populations***

European eel populations are largely found in the Mediterranean coastal basin. In a study published by Aalto in 2015, data collected from 86 lagoons in the Mediterranean basin indicated there has been a region-wide decline in eel catch that was much higher than other fisheries in the area since the mid 1970s. By analyzing the subsequent geographical and environmental patterns along with available historical trends, it was discovered that there was a drastic decrease in the spawning rate for European eels. This decrease in productivity was greatest in the larger lagoons and southern basins. Coupled with overfishing and increase in predators, eel populations are not being restocked at rates equivalent to its dwindling. The recruitment rate observed in Europe has dropped to less than 10% of those previously observed. Observed rates of decline for European eels were also significantly higher than other fisheries at the time. Therefore, there is a need to regulate activities that will further contribute to this population decline.

There are limitations to quantifying the decline in European eel populations, thus quantification studies are limited. Populations are largest in waters surrounding Europe; however, their population distribution spans the Atlantic coast of north Africa, Baltic Sea, and Mediterranean (Walmsley, 2018). European eels are also catadromous species, hence, their populations are distributed between marine, coastal, and freshwater, depending on its life stage (Figure 1). Mature yellow eels spend most of their life in freshwater bodies, typically on the surface layer. Once they are ready to breed, they mature to silver eels and migrate to their spawning site, which is speculated to be at the Sargasso Sea in the Atlantic. Glass eels then make their migration to freshwater bodies as elvers where they continue to mature and spend most of

their life as yellow eels (Dekker, 2011). However, spawning and eggs have never before been observed for European eels in the wild, thus the reproductive aspect of their life cycle is not well understood (Dekker, 2011). Due to their wide scale distribution, complex migration patterns, and existing knowledge gaps, studies to quantify the population of European eels and the decline is a challenge.



**Figure 1:** Life cycle of the European eels. The names of the major life stages are indicated along with the location associated with the life stage. Source: Dekker, 2011

#### ***4.2 The Emergence of CITES***

Public concern regarding the severe decline in animal and plant species due to their trade exploitations arose in the mid 20<sup>th</sup> century leading to the emergence of various domestic regulations. In 1900, the London Convention was proposed to regulate the trade of wild animals through wildlife management and strict hunting regulations; however, it never entered into force

(IUCN Report, 2000). In 1900, The United States passed the Lacey Act, which prohibited the interstate commerce of wildlife taken illegally, which was later expanded to those obtained from other countries (IUCN Report, 2000). The 1966 Endangered Species Conservation Act prohibited the import of wildlife at risk of global extinction unless it was for scientific or breeding purposes (IUCN Report, 2000). These national policies contributed significantly to conservation efforts from a trade perspective. However, trade involves multiple States. Therefore, for policies to be effective, it requires global commitment, contribution, and collaboration towards trade management.

In 1963, the 8<sup>th</sup> General Assembly of IUCN (International Union for Conservation of Nature) called for a treaty regulating the export, transit, and import of rare or threatened wildlife and its products (IUCN Report, 2000). This sparked several gatherings that formed drafts that would contribute to what we now know as CITES. Trade of species listed under CITES requires approvals from officials of the export and import country and extensive documentation of those approvals (CITES, Article VI). It is the responsibility of the State to ensure that they are enforcing these provisions and documenting these transactions when participating in wildlife trade. The list of protected species under CITES is grouped into three categories (Appendix I, II, III) listed in Article II of The Convention. Each category has a different level of regulation.

*Appendix I:* comprises animal and plant species that are or might be affected by trade and identified as threatened with extinction. Regulations for trade of these species, outlined in Article III of CITES, are extremely strict. Commercial trade of these species is banned completely, except in rare cases.

*Appendix II:* represents species that are not currently threatened with extinction but has the potential to if trade is not strictly regulated. In this category, it can also include species that may not be threatened themselves but must be regulated because it has a correlation to the negligent collection of listed species (e.g., look alike species). Trade of these species is allowed but is strictly regulated.

*Appendix III:* lists species that are protected and regulated in at least one country who has requested assistance from other CITES parties in regulating the trade of that species to prevent or restrict its exploitation.

European eels were included into Appendix II of this convention in 2007. Once it entered into force in 2009, import and export outside of The EU required an NDF to signify that the trade occurring is recognized to be non-detrimental to the eel stock.

#### ***4.3 EU Regulation: Trade Ban Implemented***

In 2010, The EU implemented a trade ban in support of a regulation implemented by the European Council (EC 1100/2007) in 2007 to protect and restore eel stocks in Europe (Dekker, 2011). This trade ban inhibits any trade of European eels between members of The EU and other countries. This regulation requires that all States within the EU with native European eel population to draft an Eel Management Plan. The goal is to set a target for 40% escapement, compared to natural escapement without anthropogenic activities, of silver eels migrating to ocean waters to spawn (Meyer., 2020). This regulation stipulated that 60% of the annual eel catch smaller than 12 cm in size after 2013 should only be used for restocking purposes to support restock efforts (Meyer, 2020). However, other methods outlined in the plan to achieve this goal are flexible. It could include efforts to reduce fisheries, improve habitats, etc. Reaching

this goal is hypothesized to take as much as 200 years since population levels are presently significantly lower than previous levels (Dekker, 2011). Therefore, this temporary ban by The EU was instituted as a necessary measure to support this regulation until population levels are much more stable.

#### ***4.4 Illegal Trafficking of European Eels***

Despite the implementation of CITES to regulate trade, preservation efforts for many species are hindered by their exploitation in the form of illegal trafficking. Wildlife crime is an extremely lucrative, complex, and widespread business with global involvement of various highly demanded species. An estimate of 300 million eels were trafficked into Asia between 2017 and 2018, making this the most serious wildlife crime issue in The EU (Galey, 2018). Illegal trade of European eels is extremely profitable due to their high demand as a food product. In Asia, it is considered a delicacy and an aphrodisiac (Agence France-Presse, 2018). They are sold in various supermarkets and wet markets (Richards, 2020). Available supply includes raw and live eels at various stages of life, including juvenile glass eels and mature yellow eel as well as cooked eel delicacies. It is also largely available in restaurants (Knott, 2021). Eel is widely available to the average consumer in major supermarkets in China (Richards, 2020).

Eel is also found in European cuisines. In the Netherlands, smoked eel is considered a revered traditional food (EUMOFA, 2021). However, there is high demand for smoked eel throughout most of Europe. To meet this, glass eels are commonly traded to source eel farming facilities or maintain eel populations in freshwater bodies (Richards, 2020) (Stein, 2021). Packaged eel products are also further traded. European eels sourced from Lake Lough Neagh,

located in Northern Ireland, are highly sought after for this purpose (Nijman, 2022). The Lough Neagh Eel Fishery, run by The Lough Neagh Fishermen's Co-Operative Society (LNFCS), is the largest wild commercial eel fishery in Europe (EC no 510/2006). The distinctive flavor of authentic smoked eel is attributed to having eels feed on the native substrates available in that lake contributing to a higher fat content (LNFCS website).

One contributing factor to its ineffective regulation is the visual similarities of various eel species. European eels share many physical similarities to other eel species, such as *Anguilla japonica* (Japanese eel) and *Anguilla rostrata* (American eel) (Richards, 2020). These species, though considered endangered under the IUCN (The International Union for Conservation of Nature) Red List, are not regulated under CITES because they are not highly demanded in trade. This makes it easy for illegally traded eels to evade customs by being mistaken for their legal equivalents. It is even more difficult to distinguish between processed eel products, such as smoked eel being re-exported. There have even been documented cases where European eels sold in Hong Kong are marketed to consumers as being legal eel species, due to this difficulty (Richards., 2020). This allows traffickers the opportunity to purposely intermixed legal eel species with European eels during trade in an effort to bypass enforcement. These factors increase the exploitation of other eel species. As a result, other eel species are also slowly experiencing population decline due to their increased commercial trade (Richards., 2020). Their addition to CITES Appendices may be in the not-so-distant future.

#### ***4.5 Challenges and Tools for Mitigating Illegal Trade***

Illegal wildlife trade largely contributes to conservation challenges for many species facing extreme population decline. According to Fukushima (2021), a host of factors contribute to the challenging nature of developing an effective strategy to mitigate illegal wildlife trafficking. One such challenge is that while consumption is a large factor contributing to illegal wildlife trade for many species, such as the European eel, there is a diverse set of motivations for consumption to consider. These include consumption as a social symbol and consumption for religious practices. Changing behaviors around consumption and developing policies that respect existing motivators while encouraging sustainable trade can be difficult to craft. Finding ways to involve the local communities in regulatory efforts is also constantly overlooked in strategic development. The impression is that collaborating with local entities will not yield substantial enough results to warrant the time and effort required. However, by empowering and engaging the local communities where these species exist, some of the burden to ensure sustainable trade will be adopted by these communities allowing more effective implementation and regulation by other efforts. Policies also require strong scientific basis for implementation to be effective, which for certain species can be limited. Without this information, advocating for policy implementation will be unconvincing and runs the risk of misinforming policy and conservation efforts. As more regional policies are implemented to manage these challenges and encourage sustainable trade and conservation, it also increases the susceptibility to misinterpretation and misunderstanding, especially pertaining to how these legal instruments function concurrently. Even with these policies in place, it requires a unified effort from enforcement organizations to enforce these laws. This can be a challenge as resources, capacity, and trust can vary significantly by location.



Fukushima (2021) identified four major tools that are widely available to tackle illegal wildlife trading. The first tool is implementing bans and quotas on wildlife trading. Bans can be especially effective if used in response to severe cases of trafficking as a method to implement an abrupt stop to disagreeable trading practices. Quotas, on the other hand, offers a method to lessen the need for illegal trafficking. However, for quotas to be effectively executed, it must be set based on adequate data and transparently managed. This regulation must also be complemented by efforts to educate the public on its significance, cultural substitutes where necessary, social and economic considerations, and mitigation programs in order to be effective. The second tool is encouraging sustainable exploitation by establishing protected areas, requiring certificates, and/or adopting captive breeding. These can effectively reduce overexploitation through illegal trade. Protected areas can help ensure and monitor a sustainable population for vulnerable species. Certificates and captive breeding can disincentivize illegal trading by requiring. By requiring certificates, proper channels need to be followed to participate in trade; however, regular monitoring and compliance reviews are necessary to ensure it is not abused. Captive breeding alleviates the stress on wild populations of species to meet sources for demand. The third tool is technological aids. Advancements made, such as ID guides and Wildlife Alert, can be particularly useful at trade borders to help call attention to illegal acts. The fourth tool is awareness and education. While all other tools listed can help regulate and enforce illegal trade, it does not reduce the demand for illegally traded species. There needs to be interventions in place from a demand perspective, such as movements to change behavior surrounding these species.

#### **4.6 Tools Implemented in CITES**

As a treaty, CITES has included some of the major tools for mitigating illegal trading of wildlife outlined by Fukushima (2021). Article VIII of CITES states, *“The Parties shall take appropriate measures to enforce the provisions of the present Convention and to prohibit trade in specimens in violation thereof. These shall include measures: (a) to penalize trade in, or possession of, such specimens, or both...”* This allows Parties to initiate trade bans on those not enforcing CITES regulations appropriately. Within Article XIV of CITES, *“The provisions of the present Convention shall in no way affect the right of Parties to adopt: (a) stricter domestic measures regarding the conditions for trade...of specimens of species included in Appendices I, II and III, or the complete prohibition thereof.”* Therefore, States can set domestic trade quotas for trade of any species, if they find it will help curtail illegal trafficking, support conservation efforts, and maintain economic and social excellence. As a measure to maintain sustainable levels of trading, CITES allows for trade for species listed to continue if the provisions are met, which as outlined in Article IV, include the presentation of an “export permit”, “import permit”, and/or “re-export certificate” as necessary. The presentation of these certifications signifies that trade is transpiring legally and sustainably. CITES regulation also employs the use of technological identification methods at borders to help distinguish between legal and illegal species that are difficult to differentiate.

However, the abundance of illegal trading of European eels taking place indicate that these tools are not implemented effectively within CITES. Therefore, it is important that limitations within the treaty are analyzed, and amendments are made to support these limitations to allow for more effective regulation. It also implies that devoting all the major tools available

into one treaty places an unreasonable stress on the treaty to function effectively. Rather, a dynamic approach to achieve sustainable trade by mitigating illegal trading should be employed by implementing complementing policies from the local to international organizations. This will allow the tools available for mitigating illegal wildlife trade to be divided among policies, thus allowing for more effective regulations

## **5. Methods**

This Integrated Literature review is conducted based on available and existing research on the subject. Since the illegal trafficking of European eels is considered the biggest wildlife crime in The EU despite its trade being strictly regulated under CITES, there is value to explore factors and limitations that contribute to this reality (Richards, 2020). After review of several sources, it indicated that significant decline of European eel populations was observed in the 19<sup>th</sup> century due to various compounding anthropogenic and environmental factors (Aalto, 2015). Wickström (2008) and Richards (2020) served as the central literature indicating the high demand of European eel, specifically in Asia, for consumption is largely contributing to its illegal trade internationally. This prompted the exploration into why CITES is so ineffective at regulating European eel trade.

First, background research on the purpose of CITES and why there was a need to illegal traffic these eel species was explored. Since CITES is a major policy with international presence used to ensure sustainable trading of wildlife, this treaty was the focus instrument for trade regulation. A review of the official CITES document to gain an understanding of how trade of European eels is regulated under this treaty and requirements for listing (CITES, 1973). Other

areas where European eel demand for consumption is high is also explored. Analysis on how this demand resulted in significant illegal trafficking was explored. Smoked eel is widely known to be popular in the Netherlands. Trade of European eels to Northern Ireland to meet this demand was confirmed in a published case study (EUMOFA, 2021). Brexit complicates this trade relationship in ways that could increase illegal trafficking (Nijman and Stein, 2021).

To confirm that European eels are in fact experiencing significant decline that warrants their CITES listing, research was done to find evidence of this. A published study by Aalto (2015) consolidating data from an area where European eel populations used to thrive revealed current recruitment rates are less than 10% of previous rates. There was little data and studies demonstrating their population decline dating back to the 19<sup>th</sup> century since population studies for the European eel are difficult to conduct due to the limited knowledge until more recent years of their life cycle and migration routes (EUROFISH, 2020) (Wright et al., 2022).

Evidence indicating the large-scale quantities of illegally traded European eel was also limited, due to its covert nature. However, previous literature indicated it was occurring. Research conducted focused on European eel seizures and trade discrepancies. In a published study by the Sustainable Eel Group (SEG) in 2018, almost 50% of all European eel catch was undocumented and untraceable, as one would expect when it is being illegally traded. Combined with the large quantities and incidences of seizure reports documented and consolidated, it was safe to conclude illegal trafficking of European eels was occurring at levels significantly impacting the sustainable trade goals of CITES for listed species. Since Brexit is a relatively new occurrence, there has been no evidence of large-scale illegal trafficking of European eels to

Northern Ireland specifically because The UK left The EU market. However, there was published literature on why illegal trafficking is expected to increase due to their dependence on European eel sources from The UK, where populations are most abundant, especially to Lake Lough Neagh.

Once there was evidence that consumption played a part in the illegal trafficking of European eels, literature on how illegal trading is best mitigated was done. An article published by Fukushima et al. (2021) offered valuable insight into the challenges of regulating trade of wildlife as well as major tools that can be implemented as measures to mitigate illegal trade of wildlife. This literature served as the main artifact used to evaluate how effectively CITES is drafted and implemented to regulate trade and mitigate illegal trafficking of European eels. This treaty was specifically analyzed to see what tools identified by Fukushima et al. (2021) are used and how it was integrated. Since illegal trafficking of European eels occurs in large quantities, limitations that prevent the effective implementation of these tools were analyzed.

These limitations include morphological similarities, technological availability, and knowledge gaps on European eel life cycle. This helps identify where research and development need to occur to allow for more effective implementations of these tools within CITES. Developments in these areas existed, however, not in a capacity that could considerably make CITES more effective at regulating European eel trade (Cardenosa et al., 2019) (Meyer et al., 2020) (Wright et al., 2022).

This led to the exploration of existing limitations and potential amendments within CITES that would allow for more effective trade regulation of the European eel, given the present technological and scientific limitations and valuable tools outlined by Fukushima et al. (2021). Analysis indicates that many of the valuable tools identified by Fukushima et al. (2021) are already integrated into CITES regulation, including implementing bans and requiring certificates; however, CITES is not enforcing these tools to its full capacity.

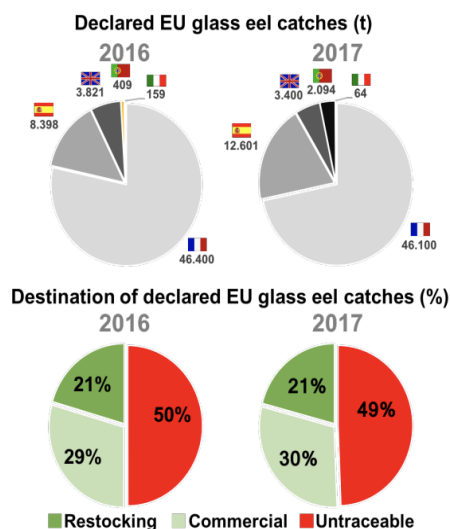
This paper also emphasizes a dynamic approach to policy by implementing various policies and measures to advocate for sustainable trade and mitigate illegal trafficking of wildlife more effectively. Research on a case study where this approach to trade regulation was effectively implemented was done. African elephants in Africa, also subject to significant trafficking for ivory demand, have employed the tools outlined within Fukushima et al. (2021) successfully to reduce poaching for ivory illegal trade purposes (MIKE CITES document, 2021). Based on this case study, suggestions on complementing policies can be used to distribute the valuable tools to mitigate illegal trade and regulate trade of European eels more effectively.

Various journal sources were used for this literature review. Literature used include peer reviewed literature, published government reports, and published reports from recognized organizations. Published literature was obtained from pointed google searches using “subject” + “journal article”. Subject represents words such as illegal trafficking, European eel, and CITES. Much of the published research on European eel was reviewed and analyzed to determine how it could be applied to regulate its trade more effectively. Published governmental reports were extremely valuable in this review. CITES website has access to various published CITES

documents, decisions, and reports on their assessment of European eel trade conditions. The IUCN and UNODC also offered significant information on European eel illegal trafficking, trade, and species status. Reports from recognized organizations were also valuable for this study. The SEG has conducted research and published reports valuable to providing transparency on the European eel population studies, illegal trafficking, and trade. There was also significant news and website articles used as a stepping point to highlight important decisions and situations to explore further and what literature to seek.

## **6. Results and Analysis**

In 2018, the Sustainable Eel Group (SEG) published a report that aimed to quantify illegally traded European eels. The SEG conducted a survey in 2016 and 2017 to determine the market demand for European eel. At the end of the 2016 fishing season (October to the end of the spring), a total of 59 tons of glass eels were caught in France, Spain, Portugal, Italy, and the UK combined, where major European eel populations exist. This is estimated to be 207 million eels. 17 tons of the catch were used for aquaculture purposes and 12 tons were used for restocking populations. In 2017, 64 tons were caught; 19 tons were used for aquaculture and 13 tons were used for restocking (Figure 2). In both years, 50% of the caught eel's purpose was undocumented and untraceable. This likely represents the magnitude of eel catch that is then illegally traded from The EU to other countries.



**Figure 2:** European Union reports of glass eel catches and destinations for 2016 and 2017. Source: SEG Report, 2018

In a 2017 published CITES document from the 69<sup>th</sup> meeting of the Standing Committee in Switzerland, there was further transparency into the illegally traded European eel industry. The EU States conducted a joint operation with Europol leading to 48 arrests and the seizure of 4,000 kg of glass eels, with an estimated profit of 4 million Euros. The trade routes used to avoid exposing this illegal act were complex, involving falsified documents and diverse shipment methods alluding to the participation of individuals from import and export countries, along with various intermediaries.

Since the EU banned the trade of European eels in 2010, all member states have reported no export instances for this species (SC69 Doc. 47.2, 2017). However, based on the seizures documented between 2013 to 2017 published in the CITES report (2017), there were significant amounts being illegally exported. Seizures were reported in various countries within Europe and Asia, with most seizures seen in China/Hong Kong SAR and France (Table 1). The patterns they



observed suggest many live glass eels are exported from The EU to farming facilities in Asia. They also discovered high amounts being re-exported to third countries where they enter their final markets. The commodity seized included live and cooked eels. However, a large majority of the demand of illegally traded European eels appeared to be live glass eels. Therefore, illegal trade tends to peak during the glass eel fishing season in October until the spring. This is expected since most illegal trade of eel is used to replenish glass eel population to source eel farming facilities or maintain eel populations in freshwater bodies (Richards, 2020) (Stein, 2021). Trade routes reported in the seizure included vehicular, air, and water transportation.

**Table 1:** An incomplete summary of European eel seizures from 2013 to 2017. Information was consolidated from various sources including CITES Biennial Reports, EU Member State seizures reports, EU-TWIX, Europol, the Sustainable Eel Group and media reports. Source: CITES document SC69 Doc. 47.2, 2017

Country of seizure	Date	Commodity	Quantity, kg <sup>4</sup>	Direction of trade	Seizure/Route details
Bulgaria	21/01/2015	Live glass eels	37.0	Import (into the EU)	Sofia Airport, <b>Bulgaria</b> : X-ray inspection found glass eels in luggage of two Chinese citizens arriving from Madrid, <b>Spain</b> . Eels were in eight Styrofoam containers, declared as food and were reportedly bought at a market in Spain.
Poland	06.04.2015	Meat	534,75	Export (from the EU)	On 06.04.15 at the road border point with the <b>Russian Federation</b> , customs seized 534,75 kg of frozen eels concealed in one of the walls of a car, designed to be exported from the EU. DNA tests proved it was European eels ( <i>Anguilla anguilla</i> ).
Poland	14.04.2015	Meat	20,6	Import (into the EU)	On 14.04.15 at the same border point (as above) Customs seized 20,6 kg of frozen European eel ( <i>Anguilla anguilla</i> ) specimens. This time it was an import attempt from the <b>Russian Federation</b> . Goods were not concealed. Species identification was based on DNA testing.
France	06/02/2015	Live glass eels	120.0	Export (from the EU)	Seized at airport, freight destined for <b>Hong Kong SAR</b> . Eels in 12 boxes, declared "Small eels", origin <b>UK</b>
France	18/03/2015	Live eels	11.8	Import (into the EU)	Seized on a road, <b>unknown</b> country of origin
France	20/03/2015	Live eels	6.5	Export (from the EU)	Seized at airport, destined for <b>French Polynesia</b>
Germany	09/2015	Meat	24 000.0 <sup>5</sup>	Import (into the EU)	Found in a container from <b>China</b> at a maritime port based on an investigation
Cyprus	11/2015	Meat	100.0	Import (EU)	Detected in a container from <b>China</b> . DNA testing was conducted by <b>Germany</b> before releasing the shipment to Cyprus
France	no date	Live glass eels	42.0	Export (from the EU)	Seized at airport, originating in <b>Spain</b> , destined for <b>China</b> , found in personal baggage
France	2016	Live glass eels	25.0	Internal (EU)	Found inside a vehicle on the way to <b>Spain</b>
France	2016	Live glass eels	163.0	Internal (EU)	Found inside a vehicle during random control
France	2016	Live glass eels	2.0	Internal (EU)	Found inside a vehicle during random control
Hong Kong SAR	01/2016	Live glass eels	109.0	Import (into Hong Kong SAR)	The shipment arrived by air from <b>Spain</b> via the <b>UAE</b> , in personal baggage. Four passengers were arrested
Hong Kong SAR	02/2016	Live glass eels	48.0	Import (into Hong Kong SAR)	The shipment arrived by air from <b>Spain</b> via <b>France</b> , in personal baggage
Country of seizure	Date	Commodity	Quantity, kg <sup>4</sup>	Direction of trade	Seizure/Route details
France	08/01/2013	Live glass eels	7.0	Internal (EU)	Seized from a vehicle on a road, illegally fished
Spain	11/08/2013	Meat	24 000.0	Export (from the EU)	Seizure made at a maritime port, shipment did not have CITES documentation
France	25/11/2013	Live glass eels	70.0	Internal (EU)	Seized from a vehicle, illegally fished
Italy	20/12/2013	Live eels	600 specimens	Internal (EU)	Italian origin, illegally fished
Portugal	00/12/2013	Live eels	270.0	Export (from the EU)	Found in air freight hidden amongst other goods, on way to <b>China</b>
France	19/02/2014	Live glass eels	312.0	Internal (EU)	Seized from a vehicle, illegally fished
Hungary	23/04/2014	Live glass eels	182.0	Export/Import	Seized at Budapest airport, <b>Hungary</b> from two Chinese citizens in personal luggage, based on intelligence information received from the Spanish CITES Management Authority. Destination of the shipment would have been Hong Kong SAR via Moscow, <b>Russian Federation</b> . Shipment was first smuggled out from the EU and sent back in Moscow, being seized on arrival to Budapest. Eels originated in <b>Spain</b> .
Portugal	00/02/2014	Live eels	272.0	Export (from the EU)	Two airport seizures, found in freight hidden amongst other goods, with wrong Customs code being used, on way to <b>China</b>
Hong Kong SAR	00/04/2014	Live glass eels	108.0	Import (into Hong Kong SAR)	Customs documentation showed that other glass eel shipments had left from Budapest airport, <b>Hungary</b> on 21/04/2014, destined for Hong Kong SAR. Hungarian authorities informed Hong Kong CITES authorities and based on this information Hong Kong SAR seized two glass eel shipments, also originating from <b>Spain</b> .
Italy	11/12/2014	Live eels	500 specimens	Internal (EU)	Italian origin, illegally fished
Portugal	22/11/2014	Live glass eels	15.0	Internal (EU)	Seized at a river port, illegally fished, believed to be destined for <b>China</b>
Germany	24/11/2014	Meat	10.0	Import (into the EU)	Seized in air freight coming from <b>Egypt</b>
China	14/01/2014	Live glass eels	n/a	Import (into China)	Twelve boxes of eel fry carried by a passenger from <b>Germany</b> without documents were seized at Beijing Airport. Shipment was on its way to Fujian Province.
Country of seizure	Date	Commodity	Quantity, kg <sup>4</sup>	Direction of trade	Seizure/Route details
Hong Kong SAR	03/2017	Live glass eels	24.9	Import (into Hong Kong SAR)	The shipment arrived from <b>Morocco</b> via <b>Qatar</b>
Hong Kong SAR	03/2017	Live glass eels	14.8	Import (into Hong Kong SAR)	The shipment arrived from <b>Portugal</b> via <b>Turkey</b>
Hong Kong SAR	03/2017	Live glass eels	25.4	Import (into Hong Kong SAR)	The shipment arrived from <b>Morocco</b> via the <b>UAE</b>
Hong Kong SAR	03/2017	Live glass eels	14.3	Import (into Hong Kong SAR)	The shipment arrived from <b>Spain</b> via <b>France</b> and <b>China</b>
Netherlands	04/2017	Live glass eels	72.0	Export (from EU)	The shipment was found in personal baggage at an airport in transit from <b>Portugal</b> to <b>China</b>
China	04/2017	Live glass eels	NA (68 bags)	Import (into China)	Shanghai Customs seized the shipment from three passengers. No further information available
China	04/2017	Live glass eels	200.0	Import (into China)	The flight arrived from the <b>Netherlands</b> and the eels are suspected to originate from <b>Portugal</b> . Intercepted in Hangzhou

Eels are commonly used in many Asian cuisines, therefore there is high demand for eels in Asia, especially in East Asia. In a *COI* DNA barcoding survey of samples sold by different brands from various retail vendors in Hong Kong, 45% of eel products sold were identified as European eel; however, Hong Kong did not document any import during that period (2017 to 2018) (Richards, 2020). As a CITES Appendix II listed species, trade is extremely regulated. No NDF was ever determined for European eels, thus all commercial trade was banned (Friedman., 2021). This means that the supply of the European eels being sold in these Asian markets is a result of illegal import. Hong Kong SAR is widely known as a significant hub for illegal glass eel trade with well documented trafficking routes (Richards, 2020). In 2017, an estimated 10 tons of European eel was illegally exported to China alone (Richards 2020). This is one of the most valuable illegal wildlife trades in Europe, with a monetary value of 900 Euro per kg (Stein, 2021). It is usually smuggled as glass eels from The EU before being sent to eel farms in Asia where it matures before being sent to markets.

In the past, European eel populations flourished in Lake Lough Neagh. Most eel catch from this lake is used to meet the demand for smoked eel. As much as 80% of the 300-ton annual eel catch is exported to the Netherlands (Stein, 2021). To continuously meet eel demand sustainably, as much as 2 tons of juvenile eels are imported from populated estuaries in England and Wales annually (Stein, 2021). The natural replenishment of eels to the freshwater lake is insufficient to meet the demand for mature eels since its sharp decline in population, therefore, Ireland depends on this restock. Following its CITES listing in 2007, the EU banned all export and import of European eels in 2010. However, commercial trade within the EU, though

regulated, is still permitted. Following the completion of Brexit in 2021, the UK no longer became part of the EU single market; however, Northern Ireland remains (Stein, 2021).

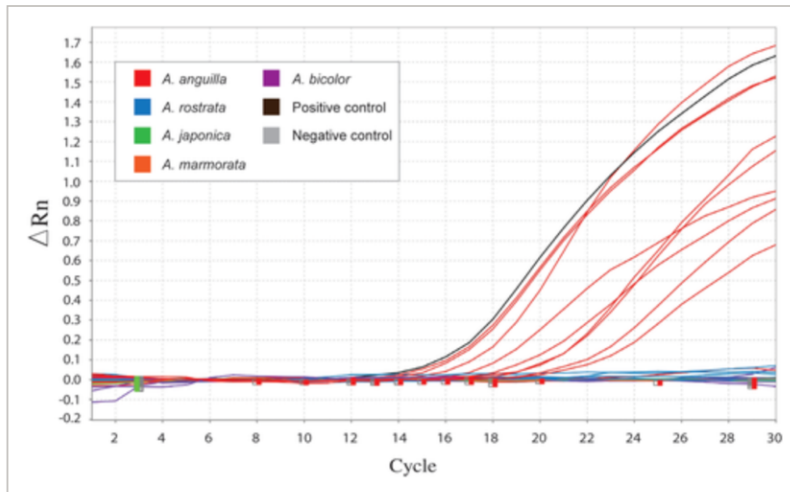
Therefore, the export of glass eels from The EU to Northern Ireland became illegal. In May 2021, the UK government permitted the export of glass eels to Northern Ireland under a special protocol following the proper CITES trade certificates are obtained (Stein, 2022). However, this process for trading eel involves more regulation protocol for both parties involved, thus making it slower while also alienating parties that are unable to acquire the necessary documentation (Cullen, 2022). Therefore, some have speculated that there will be an increase in illegal trading of European eels between European nations following Brexit.

As indicated by the large presence of European eels being internationally traded without the proper traceability and documentation, trade regulations are not effectively implemented to contribute to the conservation efforts of European eels. A large proportion of eel catch documented have no reported destination, which indicates a large portion of catch being traded illegally and undocumented. This is supported by the presence of illegal eel species in China markets despite trade being banned and none being reported. Eels are continuously being traded in large quantities illegally through various trafficking routes and methods. Though no concrete data indicates illegal trade of European eel with Ireland, illegal trafficking of eels within Europe is also expected to increase following the recent Brexit events. The significant presence of illegal trafficking of European eels indicates CITES has not been effective at regulating trade of listed species.

## **7. Discussion**

### ***7.1 Scientific Research and Technological Limitations***

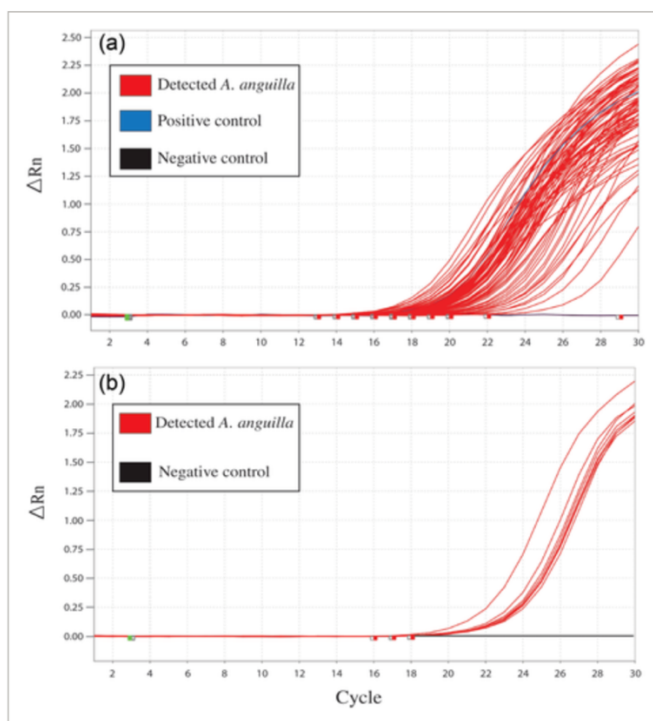
Technological limitations to distinguish European eels from other eel species are not effectively implemented as a tool to aid the CITES process. The only method to definitively distinguish between eel species is through genetic testing (Richards, 2020). This confirmation is usually necessary to prosecute those involved in its illegal trafficking (Richards, 2020). However, genetic testing is not widely available to countries and officials involved in enforcing its regulation due to time and cost limitations. Currently, the widely used DNA barcoding methods in place for trade verification for difficult to distinguish species require obtaining a tissue sample and transporting the sample to an offsite lab for testing, which could take days (Cardeñosa., 2019). There are scientific advancements being made to use real-time polymerase chain reaction (rtPCR) methods that will be quicker and portable. This method employs the use of a molecular dye and species-specific primers to detect the species of interest (Cardeñosa, 2019). It was proven to be extremely effective. Positive amplifications were seen for *A. anguilla* samples, similar to the positive control used. No amplifications were seen for samples of other eel species, even its closest relative *A. rostrata* (Figure 3).



**Figure 3:** Amplification plot using rt-PCR method for various *Anguilla* species tested. Source: Cardeñosa et al., 2019

This method for distinguishing between eel species was successfully employed in a seizure in Hong Kong. 40 plastic bags of live glass eels attempted to be illegally imported were apprehended from suitcases by authorities in 2018 in the Hong Kong airport (Cardeñosa, 2019). They employed this rtPCR method to test 20 random eel samples. All 20 tested positive as being European eel (Figure 4a). This method is also extremely sensitive. They tested 2 water samples, where the eels were kept in, and both also amplified (Figure 4b). As a result of this genetic evidence, the men involved in the trafficking were able to be prosecuted for attempting to smuggle \$300,000 worth of European eel, marking the first eel smuggling prosecution in Hong Kong (Cardeñosa, 2019). While this serves as the quickest and cheapest available technology to distinguish between eel species effectively, it is still not widely available at all custom ports. While portable, the method still requires Thermofisher Scientific equipment, reagents, and primers at each access point for testing. In addition, qualified personnel are required to perform the procedure. Therefore, widespread use of this methodology to effectively combat wildlife

trafficking will take time and resources to be implemented effectively. Despite advancement in its accessibility, depending on technology and its availability is not a luxury all countries can afford to depend on, especially considering various other species are involved in wildlife trafficking which require their own specific primers.



**Figure 4:** The amplification plot for the field test done during a Hong Kong airport seizure for European eel. (a). Amplification plot for the 20 European eel species seized and tested. (b) Amplification plot of the 2 water samples obtained from the seized bags with the live European eel. Source: Cardeñosa et al., 2019

While Fukushima (2021) highlights the aid of technology as a useful tool to mitigate illegal trafficking, it is important that these tools are efficient and reasonable in real world scenarios in addition to being effective. There needs to be advancements in methods to distinguish between species that can be readily accessible to enforcement officials without

requiring extensive resources. Advancing morphological research on eels to uncover physical distinction between species can be extremely valuable to support CITES efforts. This is not only a factor that affects the effective enforcement of trade regulations, but other management measures to promote conservation as well (Meyer, 2020). It can provide critical information on its fitness and survival to provide insight on how changes in our environment are contributing to its drastic decline (Meyer, 2020). Large scale traffic that exits at customs means officials depend on quick but effective methods to distinguish between illegal and legal specimens. There needs to be continuous useful scientific and technological advancements to assist the process to ensure it remains manageable and effective as trade increases in quantity and complexity.

Further research on the life cycle of European eels will also be valuable to reduce illegal trafficking and support conservation efforts. While it is known that European eels breed in the Atlantic, presumably in the Sargasso sea, it was never observed (Dekker, 2011). Recently, researchers were able to track silver eels for the first time confirming their 10,000 km journey to their breeding site in the Sargasso Sea (Wright, 2022). However, the research also indicated their migration speed was too slow to reach the spawning area within the breeding period. This suggests that the migration period is long and slow, spanning up to 18 months (Wright, 2022). During this migration, an inhibitory mechanism likely prevents the development of their reproductive organs, which are then deactivated once they approach the breeding area (EUROFISH, 2020). This complex hormonal mechanism is still not well understood. However, it largely contributes to the limitations of emulating this environment in captivity conducive for breeding European eels (EUROFISH, 2020). By advancing research in understanding their complex life cycles and the mechanisms involved, a closed captivity aquaculture for breeding



European eels could be effectively implemented. This will allow one of the major tools mentioned by Fukushima (2021) to be employed to reduce the dependence of trafficking eel to meet demand. This will further support the stabilization and increase of wild eel populations to previous levels.

## ***7.2 Potential CITES Amendments***

There are knowledge gaps and technological limitations that require further research and development to allow for the effective implementation of specific tools within CITES. In the meantime, CITES must be the one to adapt to existing challenges of regulating trade. There is an unreasonable expectation on policies to be both static and indefinitely effective. Since its implementation in the late 1900s, there have been many more species and specimens to regulate and more information about how these species respond to these regulations. The goal of CITES is to ensure sustainable trade; however, without fundamental data, including population and trade estimates, it is impossible to determine what sustainable thresholds are (Nuwer, 2018). There needs to be flexibility to make modifications within CITES when it does not function as intended.

Appendix I within CITES is reserved for species “*threatened with extinction which are or may be affected by trade*” (CITES, Article II). As is, a species is only added to CITES Appendix I if they can provide substantial evidence that the species is threatened with extinction and international trade significantly contributes to this risk. There are two requirements to the process; determining that the species is endangered and demonstrating that trade contributes or can contribute to that standing. However, for the European eel, there are limitations that make

quantifying their population decline and if trade is a factor with significant evidence timely (Walmsley, 2018). In the case for the European eel, concerns over their population emerged in the 1900s when there were signs of drastic decline (Aalto et al., 2016). However, CITES did not begin regulating their trade until 2007. This interval reflects the gap in knowledge, data, and resources that exist when it comes to species regulation. Since its addition, European eels have been listed as an Appendix II species which include “*all species although not necessarily now threatened with extinction may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with their survival*” (CITES, Article II). However, The IUCN Red List of Threatened Species has classified European eels as being critically endangered since after its first assessment in 2008 (Jacoby, 2015). A contributing factor to this is because there was not strong evidence to warrant stricter regulation at the time of its listing due to limitations to quantifying their population and knowledge gaps in the life cycle process.

Appendix II allows the regulation of species that may not be presently threatened but has the potential to be without trade restrictions. According to Article XV of CITES, to move species from one appendix to another it requires a proposal for the amendment and must be adopted by a two-thirds majority of Parties. Research is only starting to gain more information on the reproductive process and spawning location of European eels that is critical to make accurate population inferences. This coupled with the fact that the complex and covert nature of illegal acts make it difficult to evaluate the scale of illegal wildlife trafficking means advocating for the transition of European eels to an Appendix I species can be difficult. However, European eels would greatly benefit if CITES regulated its trade more strictly.

The purpose of CITES is simply to protect wildlife from over-exploitation through international trade. CITES is a valuable tool to support sustainable trade, however; it is not adequately armed with tools to define what that is. CITES itself is not an expert policy for determining if species should be regulated, how strictly it should be regulated, and if trade is a factor. It should allow other expert organizations, governmental or non-governmental, to provide the knowledge. Therefore, CITES categorization of species should more closely parallel determinations by experts. Since the IUCN Red List has sufficiently determined for multiple years that the European eel is critically endangered, it should allow for the automatic change in its regulation as an Appendix I species without requiring the Parties to the Conference's approval. This listing will set strict provisions for trade, which will contribute greatly to the decrease in the illegal trading of European eels.

One of the biggest limitations to the effective regulation of European eels is the physical similarities they share to other *Anguilla* species. This is a factor that prevents custom officers from distinguishing between legal and illegal species, which can be exploited for illegal trading, as well as those catching the fish. Illegal trading of European eel is highly possible because it can be marketed as their legal counterparts. In fact, other eel species are also slowly experiencing population decline due to their increased exploitation due to trade (Richards, 2020). In 2014, IUCN added American eel to their Red List (Sneed, 2014). Since the tools necessary to distinguish between them are not widely available, the policy should adapt. CITES allows for the addition of species that “*must be subject to regulation in order that trade in specimens of certain species [listed in this Appendix] may be brought under effective control*” (CITES, Article II). This is largely implemented to regulate “look alike” species. However, the protocol for adding

these “look alike” species is as challenging to advocate for as moving species between appendices. CITES should allow for the immediate regulation of species that contribute to negligent exploitation of all listed species, so long as there is sufficient evidence. As previously indicated, there is significant proof that the morphological similarities of eel species make regulation difficult. However, no other *Anguilla* species is listed under CITES Appendices (UNEP, 2021). This amendment to CITES would play a large role in enforcing the sustainable trade of European eels if the commercial trade of eels with morphological similarities are also strictly regulated.

### ***7.3 Ineffective Implementation of CITES Provisions***

While there are amendments to CITES that can be implemented to make it more effective, it is also not effectively using the tools currently within its power. As mentioned in Fukushima, (2021), one major tool to mitigate illegal trading is by implementing bans. One of the most powerful tools within CITES is the ability to issue sanctions to hold countries accountable. Failure to comply allows CITES to issue trade suspensions against the country. CITES should implement this tool towards countries, like China, who are participating in illegal trafficking of European eels. This can result in severe economic repercussions. This tool has been implemented effectively before. Thailand once had one of the largest markets for unregulated ivory before a threat of sanction was issued in 2014 if illegal ivory trade was not stopped (Nuwer, 2018). Trade bans would have catastrophic implications on their economy. Their orchid export alone brings in \$80 million annually. As a result, there was a 96% decline in ivory sold in markets between 2014 and 2016 (Nuwer, 2018).

However, under CITES, it is currently not a reliable tool to encourage change. When the same trade ban was issued on Laos for not submitting reports of their progress on combating illegal ivory trade, it was quickly lifted once they submitted a National Ivory Action Plan and illegal trade continued as usual (Nuwer, 2018). CITES hardly ever issue or pass sanctions. When it does, it is usually targeted towards large mammals that make headlines for trafficking, such as elephants (Nuwer, 2018). In addition, sanctions are only effective if countries are prepared to hold one another accountable for disregarding CITES regulations. It is ultimately the responsibility of countries party to CITES to follow the provisions outlined. Therefore, there are power dynamics at play. It becomes difficult for smaller countries to put influential countries under the hot seat by issuing a sanction against them. As is, relying on CITES sanctions to be the saving grace for European eels, is unlikely. Not because the tool is inadequate, but rather how it is implemented.

Some argue the issue is not with the treaty, but the people in charge of enforcing it (Nuwer, 2018). Countries that are party to CITES are regularly noncompliant. This happens at various stages of the process which allows for illegal trading to easily take place. Officials turn their heads at customs, sell permits, and document misinformation. Neglect also happens unintentionally. This includes officials unknowingly issuing illegal permits, which is commonly the case when it comes to European eels due to the morphological challenge. If the risk of ramification for these actions are low, the behavior will continue. Without addressing this people problem, no amendments to CITES will result in more effective regulation. One way to address this is by making it less procedural and more substantive by taking the power of accountability from the Parties to the treaty itself. CITES should outline specific acts of noncompliance and the

accompanying repercussions. This could be implemented in the case for the European eels by setting thresholds for instances of illegally traded seizures before a trade ban is implemented. This will eliminate the power dynamics in play and some of the dependence on CITES officials.

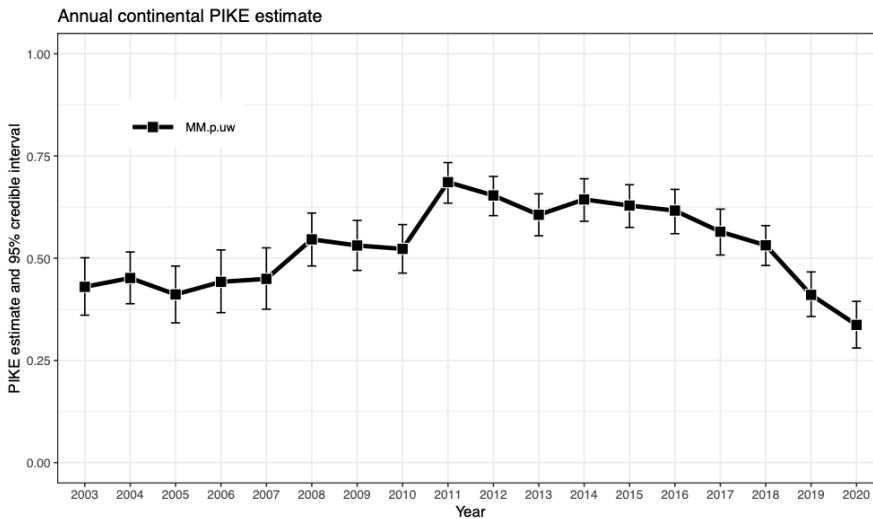
#### ***7.4 Dynamic Approach to Trade Regulations***

While these measures can be implemented to allow for more effective regulation of international trade of species, it is important to remember that CITES is one instrument. CITES specifically ensures sustainable trade of species by regulating the export and import of species listed in its Appendices. It does so largely by requiring specific permits be presented during trade. As large-scale wildlife trade occurs, the different countries involved, and the number of officials required to navigate that process, some will slip through the cracks. Relying on this treaty alone to embody all the tools necessary to ensure sustainable trade and mitigate illegal trafficking efficiently is a narrow-minded approach to regulation, regardless of how effective CITES is. This is especially the case with CITES where the power in its enforcement lies in Parties as a whole. There needs to be actions that can be taken by countries, independent of the scope of CITES regulation. Rather than relying on CITES to embody all the tools outlined by Fukushima (2021), several complementing policies should be implemented at all levels of government with the purpose to encourage sustainable trade. Valuable tools to mitigate illegal trading can be dispersed between several policies that will function cohesively. This will allow a collection of policies and regulation to efficiently implement their available tools to aid the accomplishment of the same goal.

### ***7.5 Case Study: Successful Anti-poaching Regulations in Africa for African Elephants***

In Africa, this dynamic approach was implemented to manage ivory trafficking successfully. African elephants have been poached in large numbers for decades, mainly for their ivory tusks. Since its CITES Appendix I listing in 1990, trafficking of their tusks has been one of the most well-known illegal wildlife trading issues (CITES Website). Elephant poaching is one contributing factor to their drastic population decline. MIKE, a program under CITES for Monitoring the Illegal Killing of Elephants, was established by the Conference of the Parties (COP) in 1997 (MIKE CITES document, 2021). The intention is to monitor the illegal killing of elephants, recognize any trends, and identify contributing factors, to aid decision making (MIKE Report, 2021). It evaluates poaching levels annually based on PIKE (Proportion of Illegally Killed Elephants). MIKE is an effective program to spread awareness on the large-scale trafficking of African elephants, which as mentioned by Fukushima (2021) is an important tool to increase awareness and decrease demand. By providing data and transparency on the scale and motivation behind elephant poaching, regulations to mitigate these actions can be more personal to the cause.

MIKE annual reports have reported a gradual decrease in African elephant poaching in Africa since 2014 (Figure 5) (MIKE Report, 2021). In 2020, poaching levels are lower than it was in 2003, which is a significant achievement. This trend is followed by some of the highest record seizures of ivory in 2013 and in 2019 (ETIS Report, 2020). The African elephant population is also stabilizing, if not increasing, in various African regions where significant elephant populations exist (AWF, 2022). This success in elephant conservation through trade is not accomplished by CITES regulation alone. There are several noteworthy national efforts that contributed greatly to this accomplishment.



**Figure 5:** Annual PIKE estimates for African elephants in Africa. Source: MIKE CITES Document, 2021

One contributing factor to this success in Africa is their anti-poaching policies to deter killing of elephants for illegal ivory trade purposes. This policy employs the tool of creating a protected area for African elephants outlined by Fukushima (2021). It is so effectively employed in this case because of the way these policies are supported through their enforcement. As outlined by Fukushima (2021), a unified enforcement effort can be a challenge that prevents effective regulation. One controversial policy in place in Botswana and the Congo is shoot-to-kill policies, legalizing the killing of poachers caught in the act (Flynn, 2020). Since the implementation of this enforcement strategy, these countries have seen a significant decrease in poaching. Other surrounding countries have even transported a proportion of their elephants to countries where this policy is in place due to the positive impacts on conservation (Flynn, 2020).

Less aggressive approach is also effectively implemented. As part of the 1992 SADC (Southern African Development Community) Treaty, it “recognizes wildlife as a key natural resource and a major component of the environment, which should be managed for the benefit of



the SADC communities” (2015). As mentioned by Fukushima et al. (2021), by advocating to the local community the importance of wildlife preservation and involving them in these efforts, it will make regulation efforts much more effective. As part of this incentive, it expanded the enforcement dedicated to anti-poaching. Kruger National Park in South Africa has one of the most effective anti-poaching forces implemented in its premises (Flynn, 2020). It comprises rangers, dog trackers, and helicopter support. This implementation both dissuades poachers while increasing the apprehension of poachers. This is a prime example of actions export countries can take to employ tools to prevent illegal wildlife trade.

However, the efforts of importers, where the demand originates from, is also crucial in supporting CITES and mitigating illegal trade. In recent years, several countries have issued a domestic ban on the sale and trade of ivory. Demand for ivory in China increased with the expanding middle class where acquiring ivory carvings and jewelry as a status symbol contributed to the poaching crisis (Underwood, 2013). In 2017, the trade in ivory was banned in China (WWF, 2019). This had a substantial effect on curbing ivory demand as China played a central role in incentivizing poaching. As a result of this ban, WWF has reported a significant decrease in ivory purchase and intent to purchase (WWF, 2019). As mentioned by Fukushima (2021), bans can be an extremely effective tool for mitigating illegal trade if properly implemented.

### ***7.6 Policies and Regulations to Mitigate European Eel Trafficking***

As indicated by the African elephant case study, having a host of policies that employ different tools can be an effective measure to mitigate illegal trade and promote conservation

efforts. Complementing policies should focus on tools outlined by Fukushima (2021) that are not already or not effectively employed by CITES. These include establishing protected areas for European eel populations where populations can thrive. Catch in these areas should be prohibited, if not strictly limited. This can drastically help reduce illegal wildlife trafficking by excluding sources from these areas. The effectiveness of this measure will depend on how regulations will be enforced. Involving the local communities that can benefit from these regulations will be more effective.

Regulation of eel fishing employed at Lake Lough Neagh is an excellent example of these practices. Lake Lough Neagh is a large freshwater area with minimal barriers to eel migration, thus creating an environment where eel populations can thrive (Arahamian, 2021). Currently, the LNFCS are the only ones with the right fish in this area (Arahamian, 2021). They have implemented strict fishing regulations such as setting fishing quotas, size regulations, 24/7 surveillance, etc. (LNFCS Website). In doing so, they have created a version of a protected area for these species that promotes their conservation in a capacity that remains economically beneficial for the community. It is important that other freshwater habitats where European eel populations can thrive, especially those surrounding The UK where populations are concentrated, employ similar regulations. By allowing LNFCS to control fishing regulations in this lake, it puts the responsibility and benefit of effective regulation in the local community. This approach through community involvement allows regulations to be more centralized towards the resources and needs of the community, thus more efficient measures can be implemented (Fukushima et al. (2021).

Europe also has an organization called the Sustainable Eel Group that aims to accelerate eel recovery by providing awareness and transparency into the challenges to their conservation, which includes illegal trafficking. They have been instrumental in advocating for more strict regulation of European eels. As an advocate for eel species, SEG should work with governmental organizations to implement ways to reduce demand for eel consumption, since it largely contributes to illegal eel trafficking. Interventions that alter behaviors that impact demand is an extremely valuable tool (Fukushima., 2021). One such measure is by advocating for countries where eel consumption is high to significantly increase the cost to consumers as a method to reduce demand. One of the factors contributing to high illegal European eel trade is the fact that eel is widely available to all consumers, regardless of economic size. This is the case in Asia and Europe. By making eel more of a delicacy, eel availability in wet markets and supermarkets will be eliminated, thus demand for trade and glass eel replenishment in farming facilities will decrease significantly as well. SEG should also partner with a regulatory body to establish an official management process to monitor eel trafficking and population, such as MIKE. By conducting annual assessments in this manner, it allows access to complete data to be consolidated and offers transparency to the public as well as officials on how effective management strategies have been.

While CITES does allow the capacity to institute trade bans, it has proven to be more effective, as seen with the elephant case study, when countries employ trade bans domestically. China and The Netherlands should implement trade bans as a measure to decrease illegal trafficking of European eels. By instituting domestic policies to deter behavior, it will more likely decrease the demand for these eels as well. In addition, the enforcement responsibility for

regulating trade will be distributed between CITES and domestic organizations which would reduce the stress placed on any regulatory entity to seize all traffic attempts. This will also allow for enforcement measures to mitigate illegal trading of European eels to occur before CITES officials intervene. In addition, the “people problem” plaguing CITES will no longer be a major factor in poor CITES regulation.

## **8. Conclusion**

As we enter the 6th mass extinction, it has never been more important to implement and support conservation efforts surrounding our wildlife. Illegal trafficking of species lucrative for trade is hindering these efforts. Implementing policies such as CITES to regulate trade and mitigate these activities are valuable. However, it is necessary to evaluate if they are effectively supporting conservation measures to its fullest extent. As indicated by the extensive trafficking of European eels, the tools and policies implemented to employ sustainable trade practices are not functioning to their full potential. Existing limitations, in science or technology, need to be considered when considering them as tools for trade regulation. If policies are not supporting conservation efforts effectively, it needs to be analyzed and amendments need to be made. It is also important to recognize that no one policy is not meant to bear the full weight of an issue. CITES is simply one instrument to use to regulate trade. However, effective regulation efforts will require a dynamic management approach. Complementing policies and measures are necessary for effective trade regulation.

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